Coupling and attachment of single mode fiber into laser diode transmitter

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Abstract:

In this paper we present some investigations and analysis of various parameters that contribute for increasing the coupling efficiency of laser diode to single mode fiber coupling using ball lenses coupling scheme. Dual beams from Nd:YAG laser welding system have been used for the alignment and welding of the coupling component in a butterfly configuration. The process of attachment of fiber to laser diode and welding of various coupling components, such as lens holders, fiber ferrule and welding clips have been performed in what is so called active alignment process, where the system continues measuring the coupled power during the process of coupling and welding of coupling component in their holder to each other and to the main substrate. The experimentally measured coupling efficiency using double ball lenses coupling scheme was found to be around 75% with relaxed axial, lateral and angular misalignment tolerances. From theoretical calculations we found that by optimizing the separations between various components, coupling efficiency can reach 100% with relaxed misalignment tolerances. From the effect of lateral and angular offsets as well as the 1-dB misalignment tolerances calculations, the mode fields of laser diode and single mode fiber have been found to be effectively matched.

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